

IPC-2551

Manufacturing Execution System Communications

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FIRST DRAFT

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A standard developed by IPC

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Revision History

Version	Author	Change Summary	Date
00	Bob Neal Mike McLay D. Furbush	First PINs established – with MESA charter reference and breakout of features and messages (MES+ chart first created)	5/24/2001
01	Karen McConnell D. Furbush	First Draft – with Brian Rubow's priorities	5/30/2002
02	D. Furbush	First Draft – with XML events	9/03/2002
03	D. Furbush	First Draft – with XML schema and definitions	11/05/2002
04	Bob Neal, David Morris, Rick Lloyd	First Draft – added/modified recipe verbiage and content, and created a common set of elements	11/21/2002
05	D. Furbush	First Draft – added/modified verbiage & content per team conference call	11/25/2002
06	David Morris, Rick Lloyd	First Draft – added/modified verbiage & content	12/04/2002
07	David Morris, Rick Lloyd	First Draft – added/modified verbiage & content per team conference call	12/09/2002
1		First Release –	

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IPC- 2551 Sectional Requirements for Manufacturing Execution Systems

Introduction

Factory Information Systems (FIS) form the nervous system of a manufacturing enterprise, analyzing data and delivering information to the machines and people who need to make information-based decisions. These systems provide a bi-directional flow of information between the factory floor and the rest of the enterprise and beyond.

The CAMX standards (IPC 254x and IPC255x) are designed to foster application integration and shop floor equipment communications based on XML. It assumes that application programs (including equipment interfaces) are distinct entities, and application integration takes place using a loosely coupled, message-passing approach. There is no need for a common object model, programming language, network protocol, persistent storage mechanism or operating system for two applications to exchange XML messages formatted using the CAMX standards. The two applications simply need to be able to format, transmit, receive and consume a standardized XML message.

Scope

The intent of this standard is to establish the governing semantics and an XML based syntax for information interchange between the shop floor manufacturing equipment and the monitoring and supervisory functions of the Manufacturing Execution System (MES) or other Supervision, Control and Data Access (SCADA) systems. This standard is to be used as an extension to the IPC-254x CAMX standards and in conjunction with the IPC-257x PDX Standards utilizing the communications protocols outlined in the IPC-2501 Standard Definition for Web-Based Exchange of XML

General Design Principals

Many different levels of system complexity are possible in addressing the intent outlined above. The industry participants guiding the development of this standard set forth the following design principles:

- Low Cost
- Low Complexity
- Stable
- Deterministic
- Scalable

1 Purpose

The IPC-254x CAMX Standards provides a set of an event-based communications initiated from the shop floor equipment to a community of interested applications. It is the purpose of the IPC-255x standards to complete the communication needs between these entities by providing a conversational framework for request-response, data query and reporting. IPC-2551 – this Standard – defines the most generic level of communications in the realms of equipment setup, process supervision and product monitoring and routing.

2 Interpretation

"Shall", the emphatic form of the verb, is used throughout this standard whenever a requirement is intended to express a provision that is mandatory. Deviation from a **shall** requirement is not permitted, and compliance with the XML syntax and semantics **shall** be followed without ambiguity, or the insertion of superfluous information. The words "should" and "may" are used whenever it is necessary to express non-mandatory provisions. "Will" is used to express a declaration of purpose.

To assist the reader, the word **shall** is presented in boldface characters.

3 Applicable Documents

The following documents form a mandatory part of the standard and all the requirements stated therein apply, unless modified in the section where they are invoked.

IPC-2541 Generic Requirements for Electronics Manufacturing Shop Floor Equipment Communication (CAMX)

IPC-T50 Terms and Definitions for Interconnecting and Packaging Electronic Circuits

The Manufacturing Execution Systems Association Standard Dictionary. (reference www.mesa.org)

W3C Date-time format standard

3.1 Terms and Definitions

The definition of all terms used herein **shall** be as specified in IPC-T-50, and the following:

Station
A uniquely identifiable, task-specific work area of a manufacturing environment.

Stage
A uniquely identifiable task within the sequence of manufacturing steps for electronic assemblies.

Assembly
An electronic product consisting of a printed circuit board or boards, attached electronic and mechanical components with associated connectors and cabling

Board
A single instance of a printed circuit. One circuit image of a fabrication panel. The foundation of an electronic printed circuit assembly.

Panel
An electronic assembly consisting of multiple circuit images. Homogeneous panels are defined as having multiple of the same circuit image revision and assembly (Bill of Materials) revision. Heterogeneous panels are defined a having more than one circuit image and/or more than one assembly revision.

Image
A single board or assembly circuit instance typically used to identify one member of a homogeneous or heterogeneous panel, but not limited to that.

Item
An identifiable and traceable product or product component instance.

Octet
A measured or expected value expressed as an 8-bit byte. Measured and expected values that are not necessarily numeric in nature (e.g. character strings) are expressed and compared as octets.

3.2 Date and Time Notation

All 2540 standards **shall** use the World Wide Web consortium (W3C) date time standard. This standard **shall** use the Complete Date plus Hours, Minutes, Seconds, and a decimal fraction of a second and Time Zone Designator. Two decimal places will be used in order to represent time down to a hundredth of a second. For additional information on date and time, see web page:

http://www.w3.org/TR/1998/NOTE-datetime-19980827

3.3 CAMX Compliance

The IPC-2501 document defines a message packet structure. The IPC-2541 document defines a set of Equipment, Recipe, Item, and Operator events and related message formats. All automated equipment and stations that comply with the IPC-2551 standards **shall** also comply with the event messages contained in the IPC-2541 standard as well as those communications that are described in this document. All messages **shall** be formatted in compliance with the IPC-2501 message packet structure. For consistency in XML style, all CAMX XML Element and attribute names **shall** be in mixed-case with Element names beginning with an upper case letter and attribute names beginning with a lower case letter. XML Elements are order specific and **shall** appear in the order prescribed in the XML schema definitions.

4 IPC-2551 Messages

The following sections document the information models (schemas) of the IPC-2551 messages. A tabular format is used that provides a row for each message component. The columns in these tables defines the name of the component, its type or structure, provides a brief definition or usage and gives its occurrence cardinality.

The element Extensions will be available in all messages and is shown below only this one time.

Errors are considered to be in the transmission portion of the message content and are described in the IPC-2501. An element named Rejection is used to receive a text reason why the request was denied. This was deemed to be different than an error since the receiver of the message understands the content (i.e., no errors) but cannot grant the request.

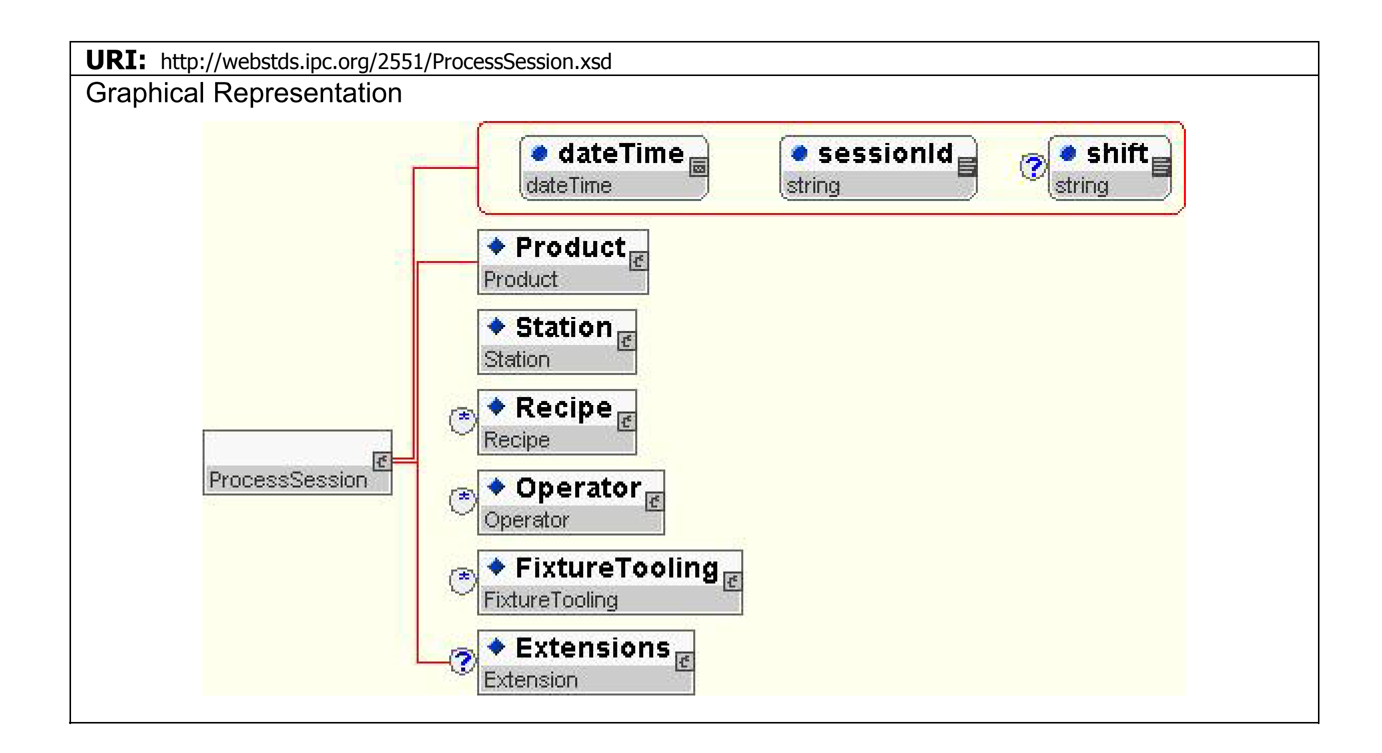
4.1 ProcessSession

Description: The ProcessSession record provides information regarding the product, process, location and environment. In recognition that there is a need for data grouping and non-repetitive reference to fundamental data elements this message is defined to meet these needs. There are typically many items processed during one session. This message is triggered by a change in the equipment or its environment, including a new operator, a shift change, a change in the product or in the task or program/recipe.

Attribute Name	Attribute Type	Description	Occ
dateTime	dateTime	Date and time of the event	1
sessionId	string	Domain unique identifier of this process session	1
Product	Element	Identifies the type, lot, batch etc. of the product	1
Station	Element	Identifies the location and enterprise	1
shift	string	Identify the work interval.	0-1
Recipe	Element	Identifies the process program, model, best practices or algorithms	0-n
Operator	Element	Equipment operator identifier	0-n
FixtureTooling	Element	Identifies the test fixture(s) if applicable	0-n
Extensions	Element	Containing non-standard XML messages and references.	0-1

URI: http://webstds.ipc.org/2551/ProcessSession.xsd

Graphical Representation



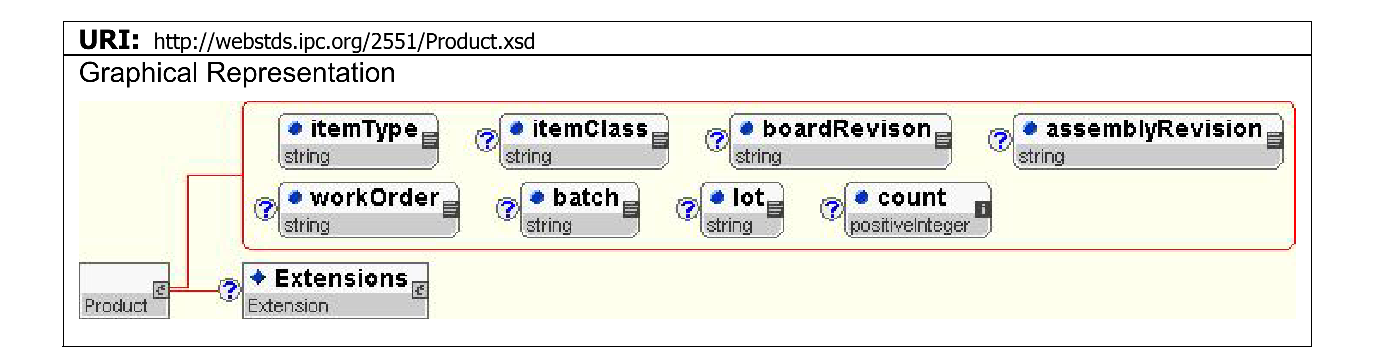
4.1.1 Element: Product

Description: The optional Product element uniquely describes a product item and its groupings.

Attribute Name	Attribute Type	Description	Occ
itemType	string	Product type id	1
itemClass	string	Identify the product classification such as system, assembly, board, firmware, mechanical, optical, etc.	0-1
itemSwRevision	string	Identify the product software revision	0-1
workOrder	string	Identify the customer work order	0-1
batch	string	Identify the product batch or grouping	0-1
lot	string	Identify the product lot	0-1
boardRevision	string	Identify the product bare board revision	0-1
assemblyRevision	string	Identify the product part revision	0-1
assemblyVersion	string	Identify the product part version	0-1
count	positiveInteger	The number of product in the lot or batch	0-1

URI: http://webstds.ipc.org/2551/Product.xsd

Graphical Representation



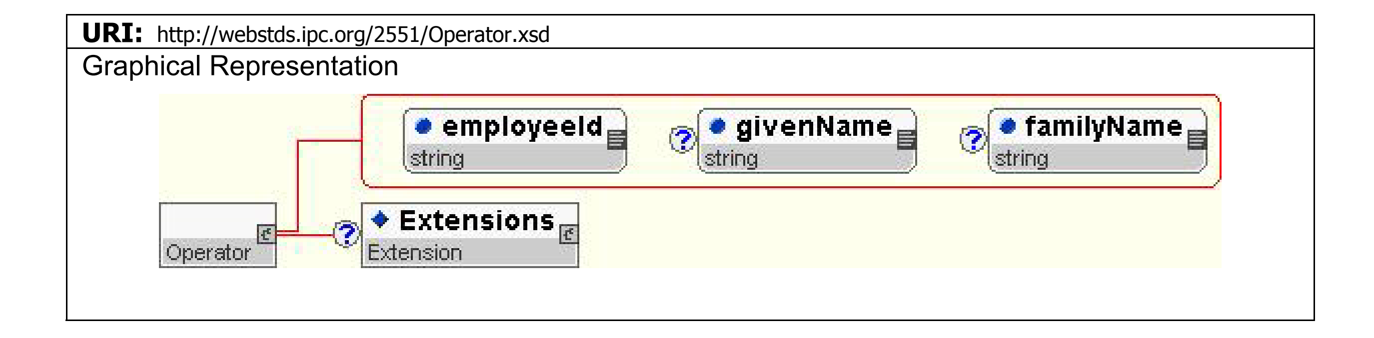
4.1.2 Element: Operator

Description: The Operator element **shall** contain a unique identifier for the operator such as their employee number or social security number, and may also contain a personal identifier such as the person's name, nickname or logon name.

Attribute Name	Attribute Type	Description	Occ
employeeId	string	Employee number, login name or internal identifier	1
givenName	string	Employee's first name	0-1
familyName	string	Employee's last name	0-1

URI: http://webstds.ipc.org/2551/Operator.xsd

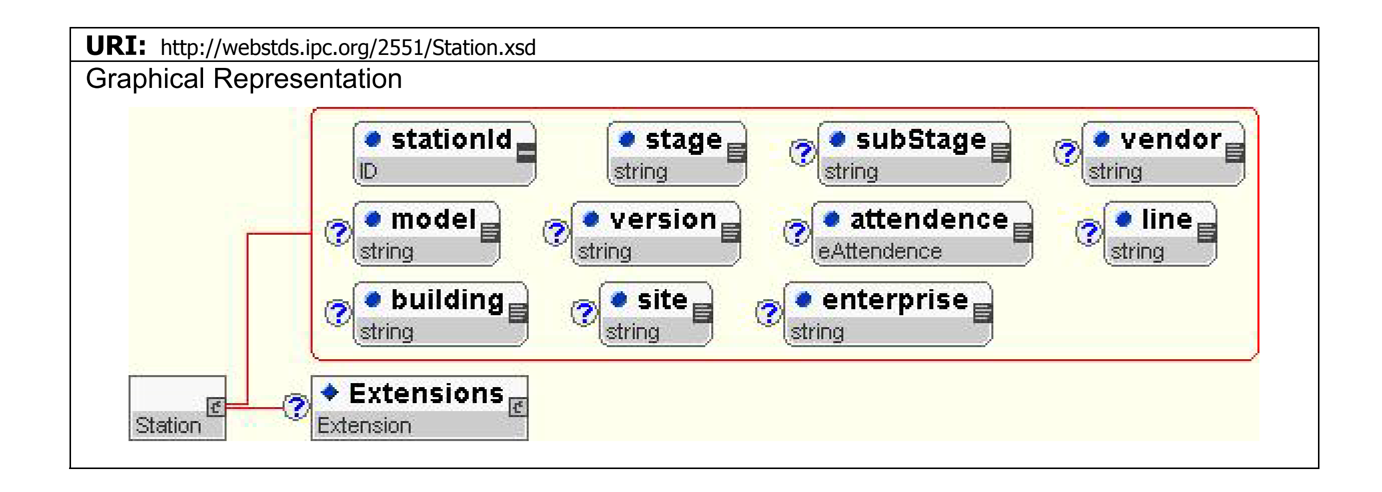
Graphical Representation



4.1.3 Element: Station

Description: A uniquely identifiable, task-specific work area or process equipment in a manufacturing environment.

Attribute Name	Attribute Type	Description	Occ
stationId	string	A uniquely identifiable, task-specific work area of a manufacturing environment.	1
stage	string	Manufacturing process step or task	0-1
subStage	string	Additional information regarding the stage, station or processing.	0-1
stationHwRevision	string	Identifies the station's hardware revision if applicable.	0-1
stationSwRevision	string	Identifies the station's software revision if applicable.	0-1
stationOS	string	Identifies the station's Operating System (OS) if applicable.	0-1
vendor	string	Identifies the station's vendor if applicable.	0-1
model	string	Identifies the station's model identity if applicable.	0-1
attendance	string	Station's mode of operation if applicable. values="MANUAL", "AUTOMATED" or "ATTENDED_AUTOMATED"	0-1
line	string	Manufacturing line or cluster.	0-1
building	string	Manufacturing facility or plant identity.	0-1
site	string	Manufacturing site or location identity.	0-1
enterprise	string	Manufacturing company or division identity.	0-1



4.1.4 Element: Recipe

Description: The Recipe element uniquely identifies the recipe, program, setup or steps currently being executed at the station or specified station zones and/or lanes. The attributes zoneList and laneList are defined using the XML string list syntax specified as a single quoted string containing white-space (e.g. SPACE, TAB) separated, alpha-numeric character groups.

Attribute Name	Attribute Type	Description	Occ
recipeId	string	Identifies the name of the program	1
RevisionDetails	Element	Identifies the details of the last revision	1
zoneList	string (list)	Identifies the zone(s) executing this recipe	0-1
laneList	string (list)	Identifies the lane(s) executing this recipe	0-1
RecipeModule	Element	Identifies the files or individual parts of a multiple part recipe	0-n

4.1.5 Element: RecipeModule

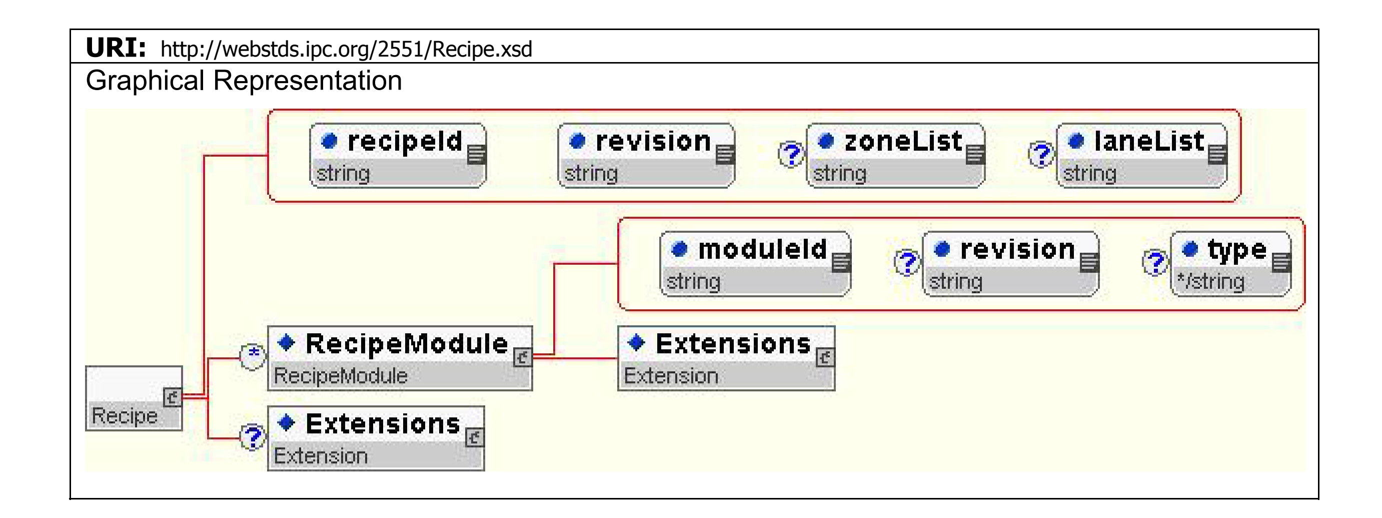
Description: The RecipeModule element uniquely identifies a single component of the recipe, program, algorithms or best practices being executed at the station and identifies its type.

Attribute Name	Attribute Type	Description	Occ
moduleId	string	Identifies the name of the recipe part	1
RevisionDetails	Element	Identifies the details of the last revision	1
type	string (enumerated)	Identifies the entry type as one of ALGORITHM | CONFIGURATION | DOCUMENTATION | EXECUTIVE | SEGMENT | FIRMWARE | LIMITS | SEQUENCE | MATERIAL_LIST | SETUP	0-1
subtype	string	Additional information regarding the recipe module type.	0-1
Location	Element	Link to the recipe module payload	0-1
status	string (enumerated)	Identifies the module status as one of RUNNING | LOADED.	0-1

4.1.6 Element: RevisionDetails

Description: The RevisionDetails element identifies the details of the last revision.

Attribute Name	Attribute Type	Description	Occ
revisionDate	dateTime	Last revision modification date for the module.	1
revision	string	Identifies the revision of the recipe part if applicable	0-1
ecnNumber	string	Last ECN number for the module.	0-1
ecnDate	dateTime	Last ECN date for the module.	0-1
originator	string	This is the person, group or enterorise that made the modification.	0-1
description	string	Description of the last change	0-1



4.1.7 Element: Location

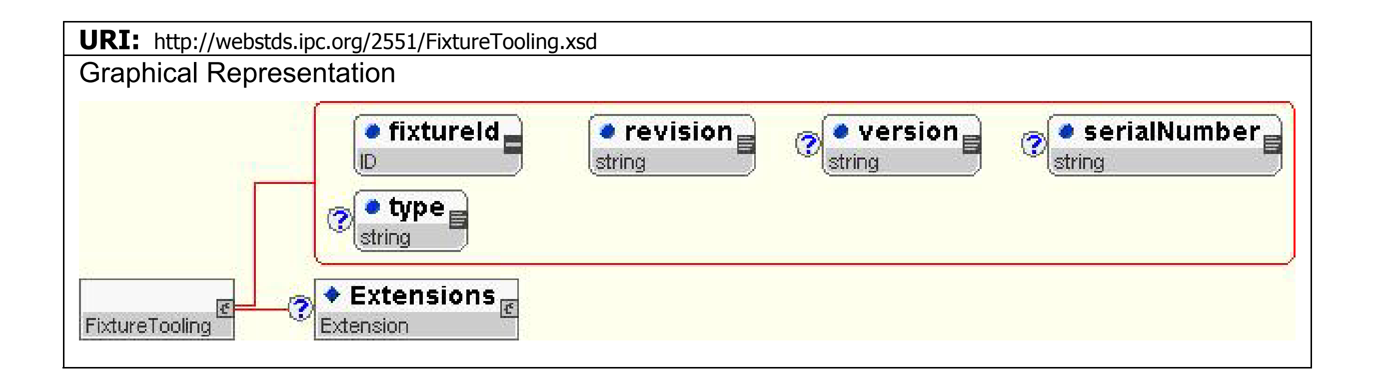
Description: The Location element specifies where the recipe module payload can be found. This location could be a file path, a URI or a database.

Attribute Name	Attribute Type	Description	Occ
locationId	string	Identifies the name of the location	1
path	string	Identifies the path to the recipe module payload	0-1
linkType	string (enumerated)	Identifies the link type as one of NFS | UNC | URI | SQL | ODBC	0-1

4.1.6 Element: FixtureTooling

Description: The FixtureTooling element uniquely describes the test fixture and can be used to track its actuation count for probing accuracy and maintenance purposes.

Attribute Name	Attribute Type	Description	Occ
fixtureId	string	Identify the test fixture	1
revision	string	Identify the revision of the fixture	1
serialNumber	string	Identify the particular fixture instance	0-1
type	string	Identify the fixture type or function	0-1
lane	string	Identify the lane where the fixture is located	0-1
zone	string	Identify the zone where the fixture is located	0-1



4.2 RecipeListRequest

Description: The RecipeListRequest message is a request that is used in two ways; 1) by the MES to the equipment (SMT machine, test station, etc.) requesting the list of programs or recipes currently stored on the equipment, and their statuses, or 2) a request from the equipment to the MES requesting the list of recipes that are valid for this station to be executed.

The hierarchical relationship between recipe lists, recipes and recipe modules is illustrated in Figure 4-2.

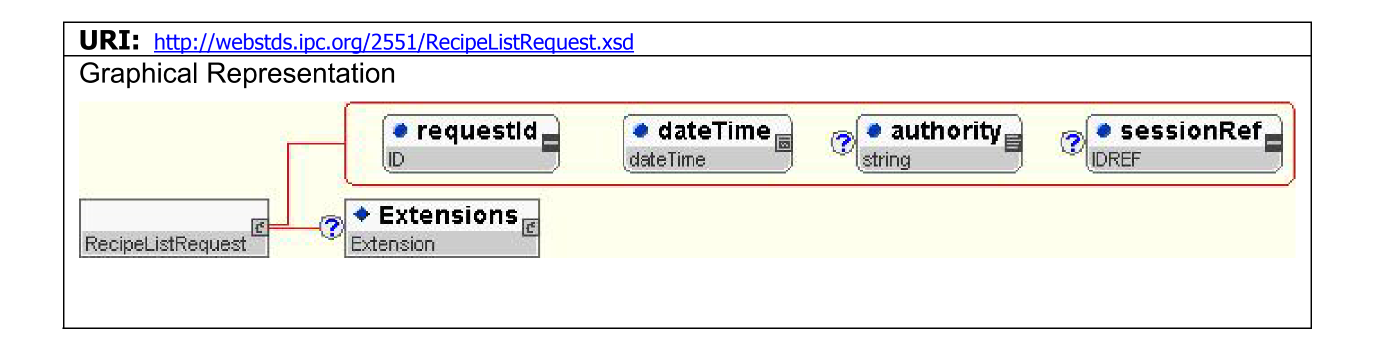


Figure 4-2: Recipe List Hierarchy

Attribute Name	Attribute Type	Description	Occ
requestId	string	Message's unique ID – used to coordinate the client's response.	1
dateTime	dateTime	The time stamp captured the instant the message is created and ready to be sent.	1
sessionRef	string	A reference to the unique process session identifier.	0-1

URI: http://webstds.ipc.org/2551/RecipeListRequest.xsd

Graphical Representation



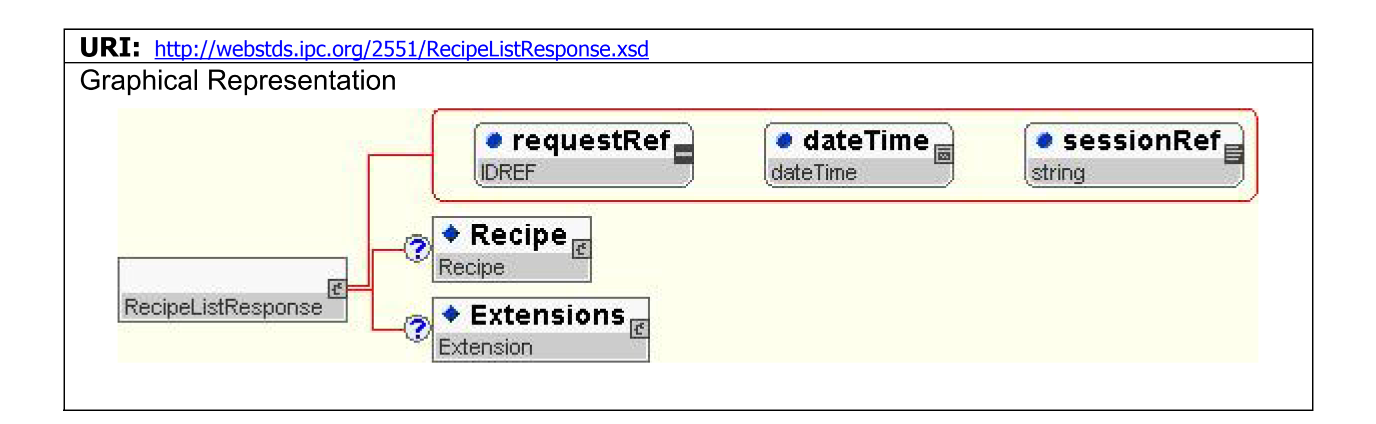
4.3 RecipeListResponse

Description: The RecipeListResponse message is the response to the RecipeListRequest. This message contains the description of recipes either 1) currently stored on the equipment and their statuses or 2) it contains the recipes that are currently needed to be loaded per the MES.

Attribute Name	Attribute Type	Description	Occ
requestRef	string	Unique ID for this response to the requesting client.	1
dateTime	dateTime	The time stamp captured the instant the Message is created and ready to be sent.	1
sessionRef	string	A reference to the unique process session identifier.	0-1
Recipe	Element	Detailed information associated with each recipe and recipe module.	0-n
authority	string	Identity or authorization to retrieve this information.	0-1
status	string (enumerated)	One of GRANTED | REFUSED	1
Rejection	Element	Reason why the request was rejected.	0-n

URI: http://webstds.ipc.org/2551/RecipeListResponse.xsd

Graphical Representation



4.4 Rejection

Description: This element uniquely describes the reason for rejection of the request.

Attribute Name	Attribute Type	Description	Occ
rejectionId	string	Rejection identifier	1
type	string	Category of the rejection.	0-1
description	string	Rejection details.	0-1

~~4.4~~4.5 RecipeRequest

Description: The RecipeRequest message is sent to ask that the list of recipe modules contained in this recipe be returned to the sender. (Please see RecipeResponse)

Attribute Name	Attribute Type	Description	Occ
requestId	string	Message's unique ID – used to coordinate the client's response.	1
dateTime	dateTime	The time stamp captured the instant the Message is created and ready to be sent.	1
recipeId	string	Identifies the name of the recipe	1
sessionRef	string	A reference to the unique process session identifier.	0-1
RevisionDetails	Element	Identifies the revision of the recipe	0-1

~~4.5~~4.6 RecipeResponse

Description: The RecipeResponse message is sent in response to a RecipeRequest.

Attribute Name	Attribute Type	Description	Occ
requestRef	string	The unique ID for this response to the requesting client.	1
dateTime	dateTime	The time stamp captured the instant the Message is created and ready to be sent.	1
sessionRef	string	A reference to the unique process session identifier.	0-1
authority	string	The identity or authorization to retrieve this information.	0-1
status	string (enumerated)	One of GRANTED | REFUSED	1
Rejection	Element	Reason why the request was rejected.	0-n
RecipeModule	Element	Identifies the files or individual parts of a multiple part recipe	0-n

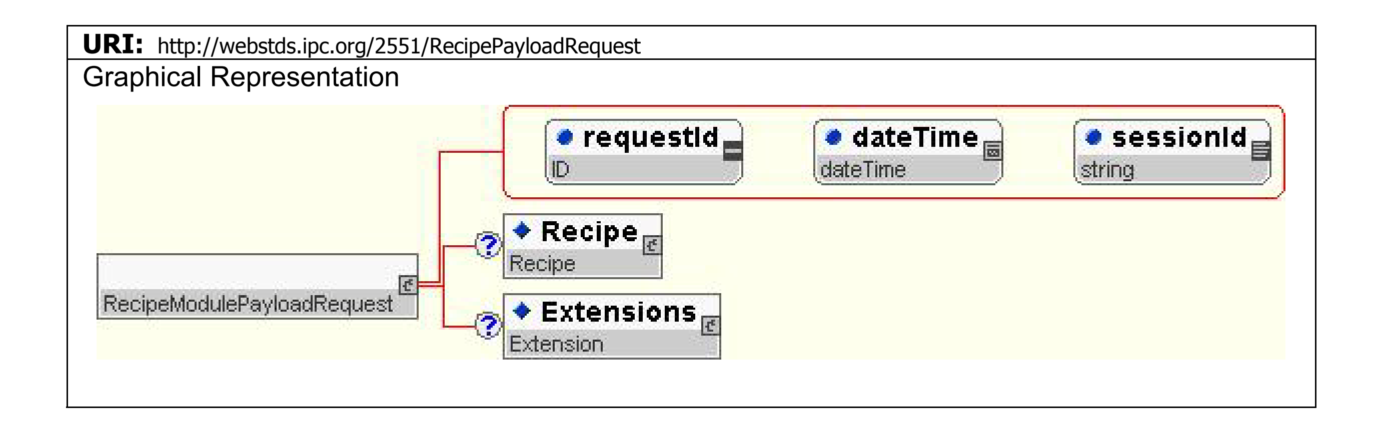
~~4.6~~4.7 RecipePayloadRequest

Description: The RecipePayloadRequest message is sent to ask that the recipe payload related to a recipe module be returned to the sender. (Please see RecipePayloadResponse)

Attribute Name	Attribute Type	Description	Occ
requestId	string	Message's unique ID – used to coordinate the client's response.	1
dateTime	dateTime	The time stamp captured the instant the Message is created and ready to be sent.	1
sessionRef	string	A reference to the unique process session identifier.	0-1
moduleId	string	Identifies the name of the recipe of the recipe module being requested	1
RevisionDetails	Element	Identifies the revision of the recipe module	0-1

URI: http://webstds.ipc.org/2551/RecipePayloadRequest

Graphical Representation



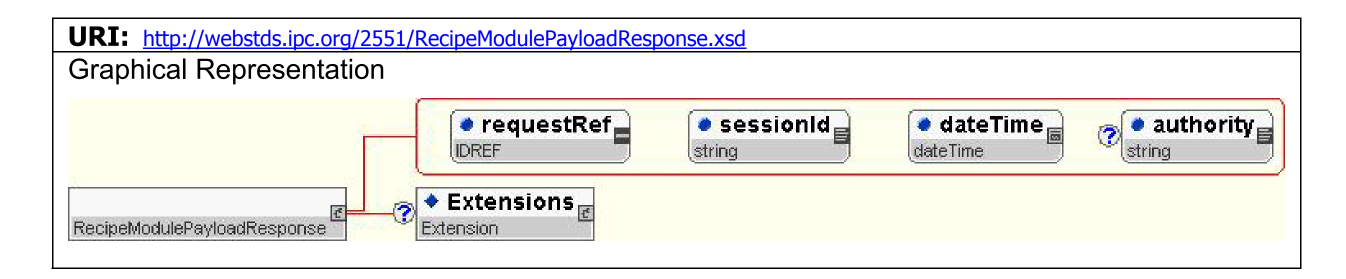
4.74.8 RecipePayloadResponse

Description: The RecipePayloadResponse message is sent in response to a RecipePayloadRequest. This message contains the recipe module payload .

Attribute Name	Attribute Type	Description	Occ
requestRef	string	The unique ID for this response to the requesting client.	1
dateTime	dateTime	The time stamp captured the instant the Message is created and ready to be sent.	1
sessionRef	string	A reference to the unique process session identifier.	0-1
authority	string	The identity or authorization to retrieve this information.	0-1
RecipePayload	Element	The contents of the recipe module	0-1
status	string (enumerated)	One of GRANTED | REFUSED	1
Rejection	Element	Reason why the request was rejected.	0-n

URI: http://webstds.ipc.org/2551/RecipeModulePayloadResponse.xsd

Graphical Representation



4.7.14.8.1 Element: RecipePayload

Description: The RecipePayload element describes the contents of the recipe payload.

Attribute Name	Attribute Type	Description	Occ
recipePayloadId	string	Identifies the name of the payload.	1
RevisionDetails	Element	Identifies the revision of the recipe payload	0-1
type	string	Type of payload (e.g., Binary, ascii, csv, xml, database).	0-1
Location	Element	Link used to retrieve the recipe payload.	0-1
content	CDATA	Contents of the recipe payload stored as a MIME message.	0-1

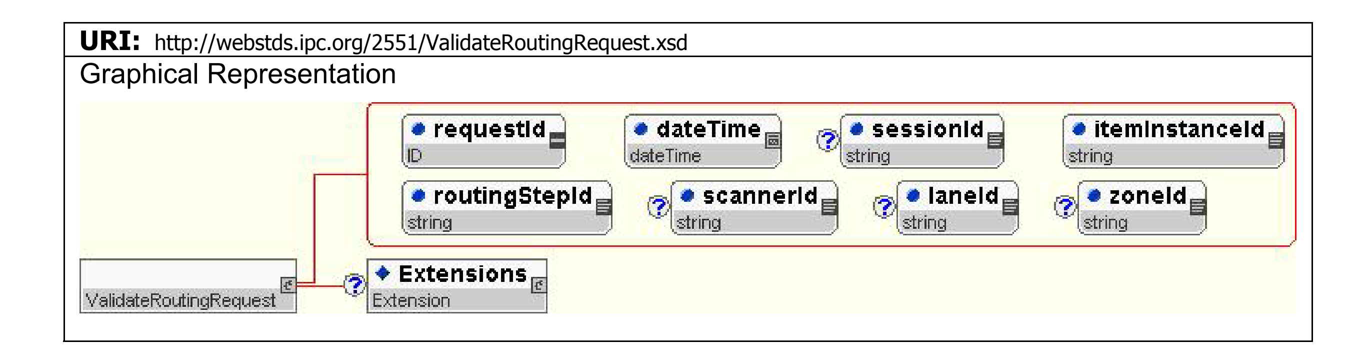
4.84.9 ValidateRequest

Description: The ValidateRequest message is sent by the equipment when a product item arrives at station. This will typically follow the IPC-2541 ItemIdentifierRead event. The request is for confirmation that the operation can be performed at this station. Validation may be done on such things as product information, test environment, operator qualifications, and location (i.e., routing).

Attribute Name	Attribute Type	Description	Occ
requestId	string	Message's unique ID – used to coordinate the client's response.	1
dateTime	dateTime	The time stamp captured the instant the Message is created and ready to be sent.	1
sessionRef	string	A reference to the unique process session identifier.	0-1
ItemInstance	Element	Item attributes that need to be validated.	1
overrideRequest	affirmation	Request from sender to override validation (Yes/No)	0-1
routingStepId	string	Contains the routing step. Typically known as the process / operation / task.	0-1
scannerId	string	Identity of the item identification reader	0-1
zoneList	string	An attribute for containing the number/identity of the Zone or Area Segment.	0-1
laneList	string	An attribute for containing the production line lane number/identity.	0-1

URI: http://webstds.ipc.org/2551/ValidateRoutingRequest.xsd

Graphical Representation



~~4.9~~4.10 ItemInstance

Description: This element is used to describe the specific instance of the item.

Attribute Name	Attribute Type	Description	Occ
itemInstanceId	string	Unique identity for a particular item – typically the serial number.	1
ipAddress	string	IP address of the item	0-1
macAddress	string	MAC address of the item	0-1
promId	string	Unique identifier of the item's PROM	0-1
ESN	string	Electronic serial number	0-1

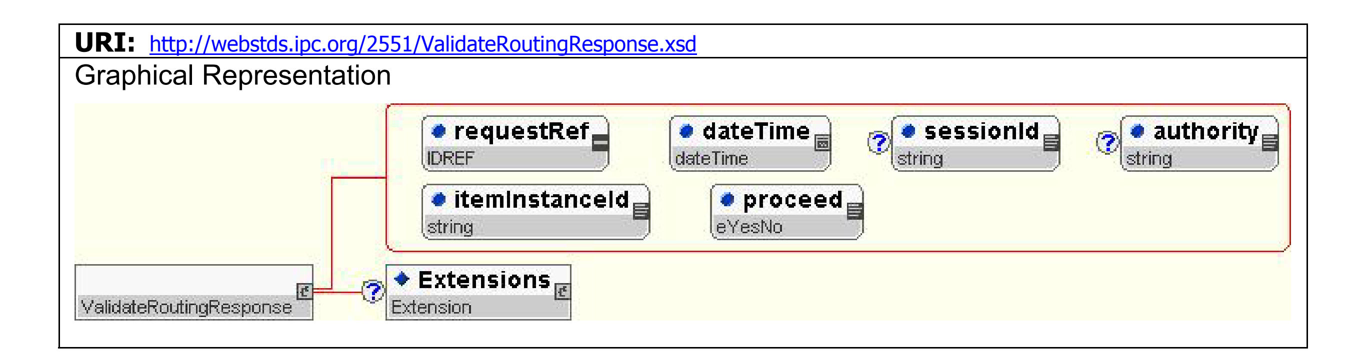
~~4.10~~4.11 ValidateResponse

Description: The ValidateResponse message is sent in answer to a ValidateRequest and either affirms or denies the validation.

Attribute Name	Attribute Type	Description	Occ
requestRef	string	The unique ID for this response to the requesting client.	1
dateTime	dateTime	The time stamp captured the instant the Message is created and ready to be sent.	1
sessionRef	string	A reference to the unique process session identifier.	0-1
authority	string	The identity or authorization to retrieve this information.	0-1
itemInstanceId	string	A unique identity for a particular item – typically the serial number.	0-1
proceed	affirmation	An enumerated element for containing the answer whether to proceed or not. Values="YES" or "NO"	1
Rejection	Element	Reason why the validation failed.	0-n1

URI: http://webstds.ipc.org/2551/ValidateRoutingResponse.xsd

Graphical Representation



4.11Rejection

Description: This element uniquely describes the reason for rejection of the validation request.

Attribute Name	Attribute Type	Description	Occ
rejectionId	string	Rejection identifier	1
type	string	Category of the rejection.	0-1
description	string	Rejection details.	0-1

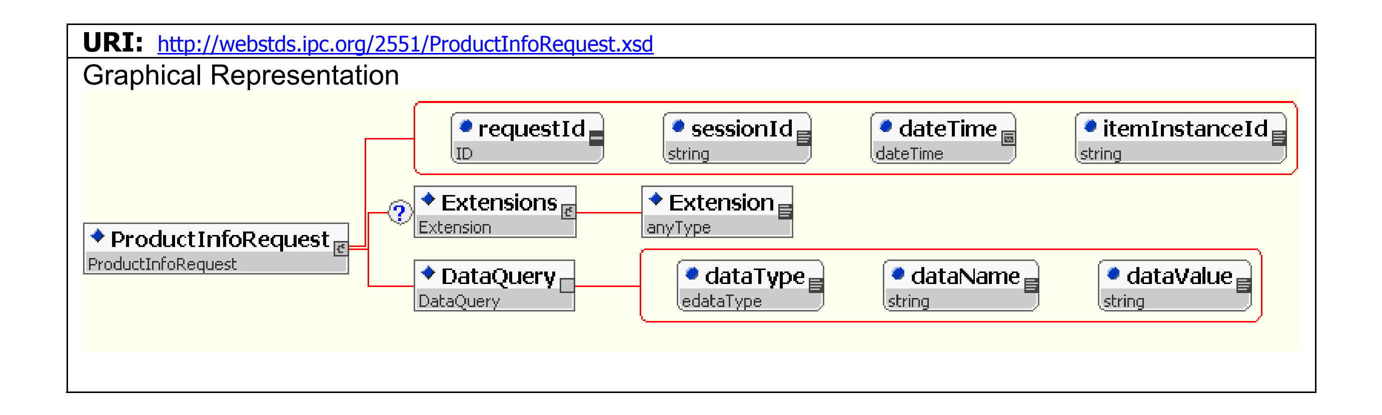
4.12 ProductInfoRequest

Description: The ProductInfoRequest message is sent to request product specific information for a particular product item instance.

Attribute Name	Attribute Type	Description	Occ
requestId	string	Message's unique ID – used to coordinate the client's response.	1
dateTime	dateTime	The time stamp captured the instant the Message is created and ready to be sent.	1
sessionRef	string	A reference to the unique process session identifier.	0-1
itemInstanceId	string	A unique identity for a particular item – typically the serial number.	1
DataQuery	Element	Criteria used to retrieve data.	0-1

Element DataQuery

Attribute Name	Attribute Type	Description	Occ
dataName	string	Search criteria name (eg. ID, database query column, etc.)	1
dataLocation	string	Additional information regarding the location of the data. This may be general file or system location, SQL or Xpath data.	0-1



4.13 ProductInfoResponse

Description: The ProductInfoResponse message is sent in response to a ProductInfoRequest. It contains information related to a specific instance of a product item.

Attribute Name	Attribute Type	Description	Occ
requestRef	string	The unique ID for this response to the requesting client.	1
dateTime	dateTime	The time stamp captured the instant the Message is created and ready to be sent.	1
sessionRef	string	A reference to the unique process session identifier.	0-1
authority	string	The identity or authorization to retrieve this information.	0-1
itemInstance	Element	Describes the specific instance of the item	1
Product	Element	Information on the product group.	0-1
itemType	string	The type of the item being returned.	0-1
ProductHierarchy	Element	A bill-of-assembly / genealogy.	0-n
DataResponse	DataElement	Criteria used to retrieve data.	0-1
status	string (enumerated)	One of GRANTED | REFUSED	1
Rejection	Element	Reason why the request was rejected.	0-n

4.13.1 Element: ProductHierarchy

Description: An element representing a bill-of-assembly (also known as the as-built/genealogy).

Attribute Name	Attribute Type	Description	Occ
parentInstanceId	string	A unique identity for a parent item – typically the serial number.	1
childInstanceId	string	A unique identity for a child item – typically the serial number.	1
notes	string	Special notes (i.e. kit item, optional assembly, documentation).	0-1

4.13.2 Element: DataElement (DataResponse)

Description: When a data request is made, the response is described using the DataResponse element. This is true whether the response is a numeric value, a string value, a bit sequence or an array of any of these. DataResponse elements **shall** contain one or more of DataNumeric or DataOctet so that the values can be reported and correctly parsed

Attribute Name	Attribute Type	Description	Occ
mode	string	Data collection mode if applicable	0-1
DataNumeric	Element	A floating point numeric value	0-n
DataOctet	Element	A string, byte or bit sequence value measured	0-n

4.13.3 Element: DataNumeric

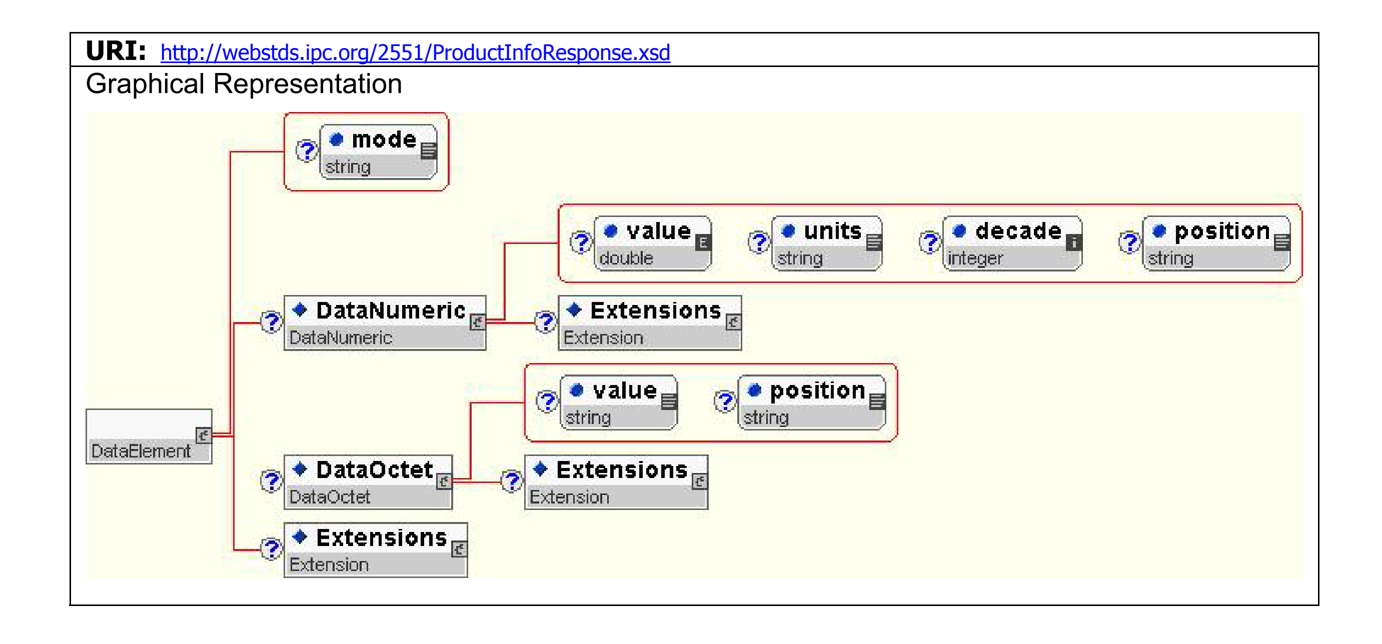
Description: Provides a numeric value.

Attribute Name	Attribute Type	Description	Occ
value	double	Parameter value	1
units	string	Units of measure	0-1
decade	double	Unit multiplier in powers of 10 (default is 0).	0-1
position	string	Describe the positional location if the expression is for a vector or multidimensional array of values	0-1

4.13.4 Element: DataOctet

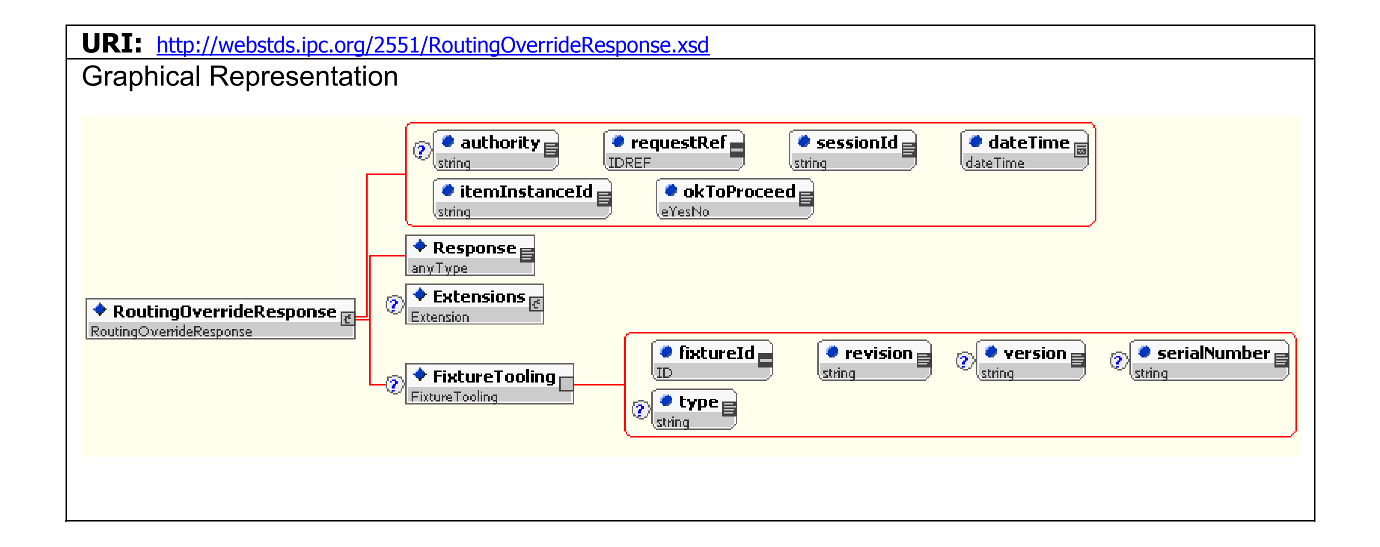
Description: Provides a string, byte or bit sequence value.

Attribute Name	Attribute Type	Description	Occ
value	string	Measured sequence	1
position	string	Describe the positional location if the expression is for a vector or multidimensional array of values	0-1



URI: http://webstds.ipc.org/2551/RoutingOverrideResponse.xsd

Graphical Representation



4.14 HistoricalDataRequest

Description: The HistoricalDataRequest message is sent to request data previously collected for a particular product item instance.

Attribute Name	Attribute Type	Description	Occ
requestId	string	Message's unique ID – used to coordinate the client's response.	1
dateTime	dateTime	The time stamp captured the instant the Message is created and ready to be sent.	1
sessionRef	string	A reference to the unique process session identifier.	0-1
itemInstanceId	string	A unique identity for a particular item – typically the serial number.	1
DataQuery	Element	Criteria used to retrieve data.	0-1

Element DataQuery

Attribute Name	Attribute Type	Description	Occ
dataName	string	Search criteria name (eg. ID, database query column, etc.)	1
dataLocation	string	Additional information regarding the location of the data. This may be general file or system location, SQL or Xpath data.	0-1

URI: http://webstds.ipc.org/2551/HistoricalDataRequest.xsd
Graphical Representation

4.15 HistoricalDataResponse

Description: The HistoricalDataResponse message is sent in response to a HistoricalDataRequest. It contains historical data related to a specific instance of a product item.

Attribute Name	Attribute Type	Description	Occ
requestRef	string	The unique ID for this response to the requesting client.	1
dateTime	DateTime	The time stamp captured the instant the Message is created and ready to be sent.	1
sessionRef	string	A reference to the unique process session identifier.	0-1
authority	string	The identity or authorization to retrieve this information.	0-1
itemInstanceId	string	A unique identity for a particular item – typically the serial number.	1
DataResponse	DataElement	Criteria used to retrieve data.	0-1
status	string (enumerated)	One of GRANTED | REFUSED	1
Rejection	Element	Reason why the request was rejected.	0-n

URI: http://webstds.ipc.org/2551/HistoricalDataResponse.xsd
Graphical Representation

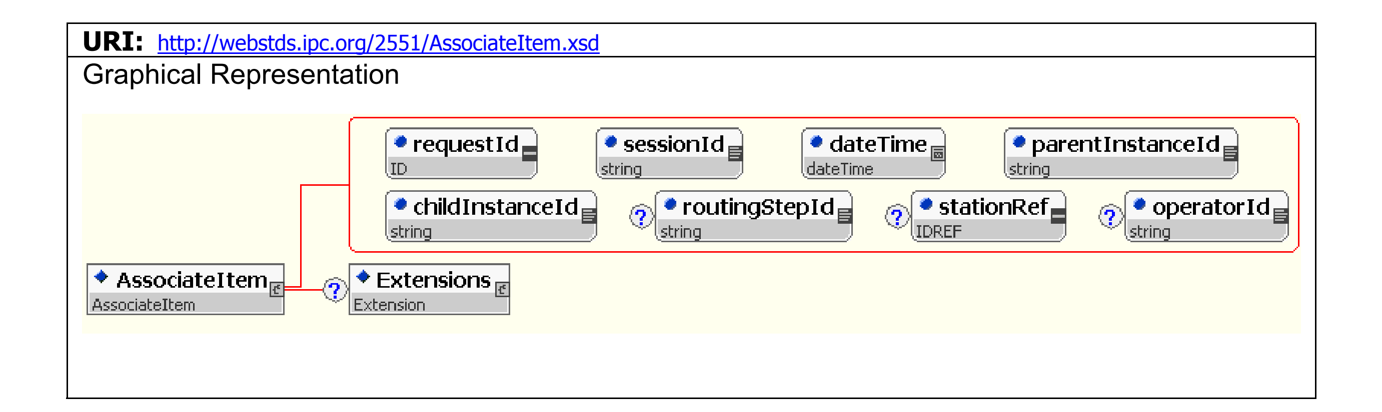
4.16 AssociateItemRequest

Description: The AssociateItemRequest message is sent to request the creation of a parent child relationship between the instances specified.

Attribute Name	Attribute Type	Description	Occ
requestId	string	Message's unique ID – used to coordinate the client's response.	1
dateTime	dateTime	The time stamp captured the instant the Message is created and ready to be sent.	1
sessionRef	string	A reference to the unique process session identifier.	0-1
parentInstanceId	string	Unit I.D. of the parent assembly – typically a serial number.	1
childInstanceId	string	Unit I.D. of the child assembly – typically a serial number.	1
routingStepId	string	The routing step. Typically known as the process / operation / task.	0-1

URI: http://webstds.ipc.org/2551/AssociateItem.xsd

Graphical Representation



4.17 AssociateItemResponse

Description: The AssociateItemResponse message is sent in response to a AssociateItemRequest. It either grants or refuses the request.

Attribute Name	Attribute Type	Description	Occ
requestRef	string	The unique ID for this response to the requesting client.	1
dateTime	dateTime	The time stamp captured the instant the Message is created and ready to be sent.	1
sessionRef	string	A reference to the unique process session identifier.	0-1
authority	string	The identity or authorization to retrieve this information.	0-1
status	string (enumerated)	One of GRANTED | REFUSED	1
Rejection	Element	Reason why the request was rejected.	0-n